CLAIMS

1. Marine vessel, such as ships, floating platform etc, where the whole or part(s) comprises a layered structure including two substantially parallel metal sheets with a concrete layer in between, where the concrete has density significantly less than that of normal concrete, and less than about 1200 kg/m^3, where the layered structure is dimensioned as if the concrete layer in the structure carries essentially no tension but is carrying most compressive forces and support the metal sheets.

2. Layered structure for use in marine vessels, such as ships, floating platforms etc, comprising two substantially parallel metal sheets with a concrete layer in between, where the concrete has weight of less than for normal concrete, and less than 1200 kg/m^3, where the layered structure is dimensioned as if the concrete layer in the structure carries essentially no tension but is carrying most compressive forces and support the metal sheets.

3. Marine vessel or layered structure in accordance with claim 1 or 2, wherein the metal sheets on the surface faced towards the concrete layer comprises means to increase the bonding or connecting properties between the metal sheets and the concrete layer.

4. Marine vessel or layered structure in accordance with claims 1 or 2, wherein the means to increase the bonding properties are an increased roughness in the surface of the metal sheets, or an added adhesive layer or dowels or a combination of these.

5. Marine vessel or layered structure in accordance with claim 4, wherein the dowels reaches a substantial distance into the concrete layer, and at most to the metal sheet on the opposite side of the layered structure.

6. Marine vessel or layered structure in accordance with claims 1 or 2, wherein there in the concrete layer in the layered structure are added fibres t enhance the

concrete layer's ductility, reduction of crack openings, and capability for carrying tension forces.

7. Marine vessel or layered structure in accordance with claims 1 or 2, wherein there between the two metal sheets is at least one connector.

8. Marine vessel or layered structure in accordance with claims 7, wherein the connector comprises a point connection.

9. Marine vessel or layered structure in accordance with claim 7, wherein the connector comprises girders in at least one direction.

10. Marine vessel or layered structure in accordance with one of the proceeding claims, wherein the concrete layer comprises a plurality of longitudinal substantially parallel load carrying channel elements with equal or different cross sections and with an internal void, which may, together with other elements in the layered structure, form spar-boxes.

11. Marine vessel or layered structure in accordance with claim 10, wherein the channel elements are connected to the adjacent metal sheets with spacers.

12. Marine vessel or layered structure in accordance with claim 10, wherein the two sides of the channel elements that are oriented perpendientar to the metal surface sheets extend beyond the closed channel form to be attached directly to the two metal sheets.

13. Marine vessel or layered structure in accordance with claims 10,11 or 12, wherein both open ends of channel elements are joined with girders with longitudinal direction transverse to the channel element's longitudinal direction and form closed spar-boxes.

14. Marine vessel in accordance with claim 13, wherein there is access to at least one of the spar-boxes in the layered structure, and the spar-box may function as a service shaft and/or inspection shaft or similar.

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15. Marine vessel in accordance with claim 14, wherein there is access to the spar-boxes in the concrete layer in a bulkhead so that the spar-boxes may function as compartments for instance for ballast water.

16. Marine vessel in accordance with claim 13, wherein there is access to the spar-boxes in the concrete layer in the layered structure, so that the spar-boxes may function as compartments for fuel.

17. Marine vessel or layered structure in accordance with one of the preceding claims, wherein one or both of the surfaces of the metal sheets faced away from the concrete layer or the inside of a spar-box may include another outer layer of a different material.

18. Method for improving carrying capacity of existing structures, with the following steps:

- attaching at least one other plate element to the existing structure to form a void,
- filling the void with concrete with density significantly less than that of normal concrete, and less than about 1200 kg/m^3 to the void, and
- letting the concrete cure.

19. Method according to claim 18, wherein other voids in the existing structure is filled with concrete, with a density significantly less than that of normal concrete, and less than about 1200 kg/m^3 to the voids, where the layered structure is dimensioned as if the concrete layer in the structure carries essentially no tension but is carrying most compressive forces and support the metal sheets.

20. Method according to claim 18 or 19, wherein
making before adding the concrete at least one aperture in the proximity of the vertical highest portion of the void to facilitate evacuation of air and for determining when the void has been fully grouted, adding concrete to the void through at leas one other access to the void.

21. Method according to claim 18 or 20, wherein plate elements are attached to both sides of the existing structure to form voids.

22. Method according to one of the claims 18-21, wherein the existing structure is a corrugated structure having alternating mainly parallel ridges and grooves and

the at least one other plate element is attached such that it covers at least one groove in the corrugated plate and thereby forms at least one void.

23. Method according to one of the claims 18-22, wherein the plate element covering a groove in the corrugated existing structure is attached by welding or other ways of attaching the sides of the plate elements to the ridges in the corrugated existing structure.

24. Method according to one of the claims 18-20, wherein the voids are formed by plate elements attached to stiffener means being parts of the existing structure.

25. Method according to claim 24, wherein the stiffener means are modified before or after plate elements are attached to them to form voids.

26. Improved corrugated structure with alternating mainly parallel ridges and grooves, wherein it comprises on one or both sides at least one plate element, attached to the corrugates plate so that the plate element covers at least one groove and forms a void, which void is filled with a concrete with a density significantly less than that of normal concrete, and less than about 1200 kg/m^3, where the layered structure is dimensioned as if the concrete layer in the structure carries essentially no tension but is carrying most compressive forces and support the metal sheets.

27. Improved corrugated structure according to claim 26, wherein all grooves on at least one side are covered by plate elements, thereby forming a smooth surface.

28. Structures in ships or vessels like for instance bulkheads, side walls, bottom structures etc with improved strength and carrying capacity made according to the method described in one of the claims 18-25.

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